CareFusion

Low Flow MicroBlender and High Flow MicroBlender

Instruction Manual

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Low Flow MicroBlender
and
High Flow MicroBlender

Section 1: Introduction

The MicroBlender is a lightweight, compact, air-oxygen blender that provides precise mixing of medical-grade air and oxygen.

The MicroBlender provides oxygen concentrations from two gas-outlet ports.

Low Flow MicroBlender

High Flow MicroBlender

The MicroBlender can be used in conjunction with:

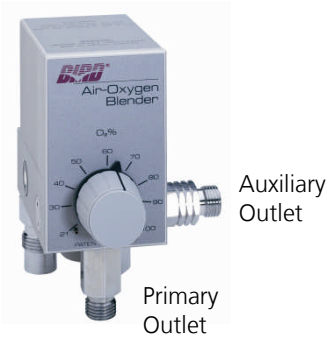
- Oxygen hoods
- Resuscitation bags
- Masks
- Transports
- Nasal cannulas
- Treatments

Section 2: Operation Overview

The MicroBlender provides selection of oxygen concentrations by means of a single control knob located on the front of the unit. Oxygen concentrations ranging from 21 to 100% are available.

	Outlet	Flow Range	Bleed Flow
Low Flow MicroBlender	Primary, Left Side	3-30 LPM	No Bleed Flow
	Auxiliary, Right Side	0-30 LPM	2.5-3.5 LPM
High Flow MicroBlender	Primary, Bottom	15-120 LPM	No Bleed Flow
	Auxiliary, Right Side	2-100 LPM	10-12 LPM

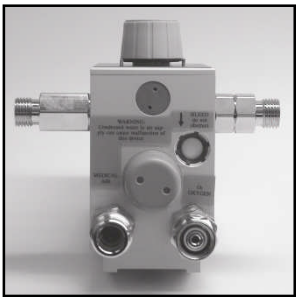
Low Flow MicroBlender Outlets



High Flow MicroBlender Outlets

Gas Inlets

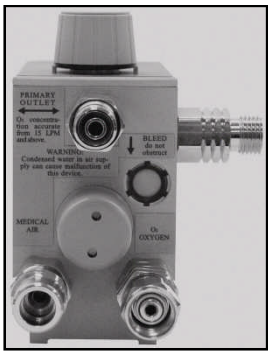
The ports located on either side of the unit allow flexibility for the clinician. The MicroBlender operates by using two 30–75 PSI gas sources that enter the device through DISS or NIST connectors located on the bottom the unit.



Air and oxygen hoses are connected directly onto the MicroBlender gas inlets.

30 - 75 PSI Inlet Connectors

Each inlet connector incorporates a 30 micron particulate filter. After passing through the filter, the gases travel through duckbill check valves that prevent reverse gas flow from either the air or oxygen supply systems.



30 - 75 PSI Inlet Connectors

The MicroBlender is tested for compliance with ISO 11195E (1995), clause 6, regarding reverse-gas flow as delivered.

Balance Module

The gases then enter the balance modules, which equalize the operating pressures of the air and oxygen. The diaphragm in the balance module responds to a difference in pressure and directs the movement (stroke) of each poppet contained within the air and oxygen chambers. The movement of each poppet adjusts the amount of gas fl owing through the balance module, equalizing the air and oxygen pressures.

Proportioning Module

From the balance module, the gases flow into the proportioning module and mix according to the oxygen percentage selected with the MicroBlender control knob. This module consists of a double-ended poppet positioned between two valve seats.

One valve seat controls the passage of air and the other valve seat controls the passage of oxygen into the MicroBlender outlets. At this point, the two gases have been blended according to the oxygen percentage selected by the control knob.

Alarm/Bypass

The alarm feature provides for an audible alarm if source pressures differ by 20 ±2 PSI or more. The primary purpose of the alarm is to audibly warn the operator of an excessive pressure drop or depletion of either source gas. The alarm will also activate when there is an elevation of either source gas resulting in a 20 ±2 PSI difference. Should both gas pressures (oxygen or medical air) increase or decrease simultaneously, and a 20 ±2 PSI differential is not seen, there will not be an audible alarm. If either source gas pressure drops, the output pressure of the blender will drop similarly, since the source gases are always balanced to that of the lower pressure.

The bypass function operates in unison with the alarm. The alarm bypass poppet communicates directly with the air supply on one end and the oxygen supply on the other.

When the two source gases are near equal in pressure, the alarm bypass poppet is positioned over the bypass channel, blocking the flow of both gases. The poppet will remain seated for unequal pressures up to 20 ±2 PSI. Once a 20 ±2 PSI difference occurs, the higher gas pressure will overcome the spring force and pressure of the poppet at its opposite end, thus creating a path (air or oxygen) to flow into the alarm channel.

The gas with the higher pressure will also flow directly to the blender outlet port bypassing the Balance and Proportioning Modules. The gas is also directed to the bottom of the unit to the reed alarm, thus creating an audible warning. The oxygen concentration will be that of the gas at the higher pressure. The blender in the alarm/bypass mode will deliver the oxygen (100%) or medical air (21%) until the pressure has been restored to a differential of approximately 6 PSI.

If the blender is set at 21% and the OXYGEN source pressure is reduced enough to produce a 20 ±2 PSI or greater differential, the unit may not alarm because it will continue to deliver 21% concentration according to the setting. If the control is moved slightly from the 21% setting, the alarm will sound.

Similarly, if the blender is set to deliver 100% concentration and AIR source pressure is reduced or lost, the unit may not alarm because it will continue to deliver the selected 100% concentration.

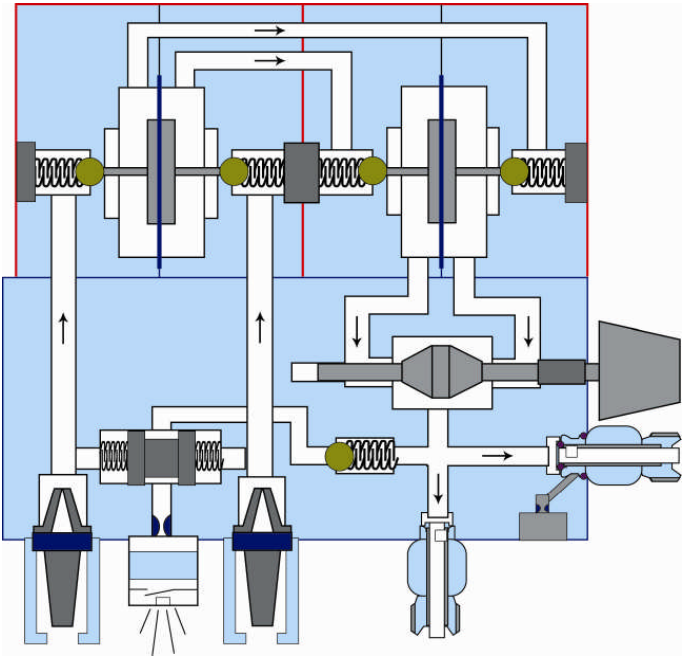
If the blender is left connected to source gases but is not being used (i.e., no output flow or bleed flow) the unit will not alarm if a 20 ±2 PSI or greater pressure differential develops. If the blender is not in use, an alarm under these conditions will be an unnecessary distraction or nuisance.

Outlet Ports

On the Low Flow MicroBlender, two outlet ports are located on the right and left sides of the MicroBlender and allow low ranges from 0-30 LPM with bleed and 3 - 30 LPM without bleed respectively. On the High Flow MicroBlender, the primary outlet port is located on the bottom of the MicroBlender, and the auxiliary outlet is located on the right side of the MicroBlender, allowing ranges from 15 to 120 LPM without bleed and 2 to 90 LPM with bleed respectively.

Bleed Outlet

For the Low Flow MicroBlender, when a connection is made to the right side outlet port, for example, when a flow meter is attached, a bleed flow of 2.5-3.5 LPM is achieved. For the High Flow MicroBlender, when a connection is made to the right side outlet port, a bleed flow of 10-12 LPM is achieved. For both Blenders, the bleed flow exits the unit through a muffler port located on the bottom of the MicroBlender.



High Flow MicroBlender

Section 3: Warnings, Cautions, and Notes

The MicroBlender should be operated by trained, qualified medical personnel under the direct supervision of a licensed physician. Before clinical application, the following WARNINGS, CAUTIONS and NOTES should be read and understood.

Note:

A specific point is made to assist the operator in understanding the equipment.

Caution!

Conditions may exist that could damage the MicroBlender or other pieces of equipment.

Warning!

Conditions may exist that could adversely affect the operator or patient.

Note:

Users are advised to use inlet pressure regulators with the MicroBlender to display system pressure.

Allow equilibration time for FiO_2 changes before analyzing gas.

Caution!

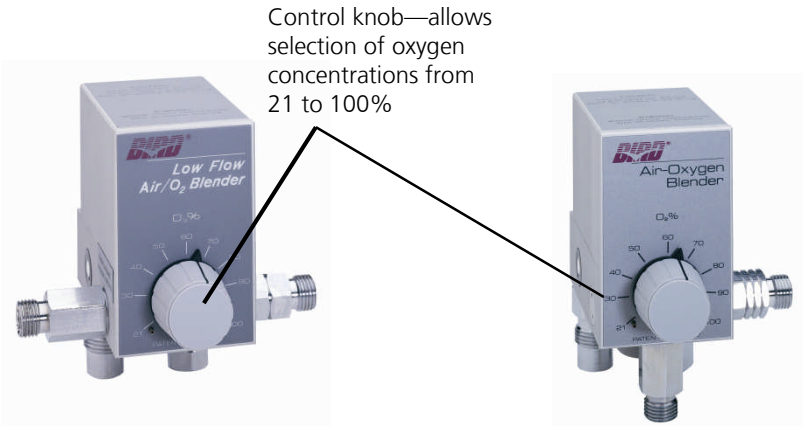
- Always operate air/oxygen blenders with clean and dry medical grade gasses. Contaminant or moisture can cause defective operation. Air used for medical purposes must meet USP compressed air and/or ANSI Z86.1 1973 grade F, and water vapor content must not exceed a blender's dew point of 5°F below the lowest ambient temperature to which the delivery system is exposed. Particulate content must not exceed that which would be downstream of a 15 micron absolute filter.
- Water vapor content of medical air or O_2 supply to the MicroBlender must not exceed 5.63 grams H_2O per cubic meter of non-condensable gas.

Warning!

- If either the air or oxygen gas source fails, the MicroBlender alarm sounds, alerting the clinician that a condition has occurred that may significantly alter the FiO_2 and flow output from the MicroBlender.
- If either the air or oxygen gas source pressure is reduced or increased creating a pressure differential of 20 ±2 PSI, the MicroBlender alarm sounds. This condition significantly alters the FiO_2 and flow output from the MicroBlender.
- Always operate the MicroBlender with clean and dry medical grade gases.
- Air Inlet Filter/Water Trap (P/N 07426) is recommended for use with the MicroBlender.
- The patient gas must be monitored with an oxygen analyzer.
- DO NOT steam clean, autoclave, or otherwise subject the MicroBlender to temperatures above 145°F (62°C).
- DO NOT immerse the assembled MicroBlender in liquid decontamination agents.
- Consult a physician for appropriate FiO_2 setting.
- DO NOT tape, obstruct, or remove the reed alarm outlet at any time.
- DO NOT occlude or obstruct the bleed port or muffler on the bottom of the MicroBlender.
- Adjustment of the oxygen concentration must be verified using an oxygen analyzer.

Section 4: Controls and Alarms

The MicroBlender delivers selected oxygen concentrations through two outlet ports. The outlet ports, although similar in appearance, have different flow range specifications. The two outlet ports provide a choice of flow ranges based on the application desired. Both outlets may be used simultaneously, provided the combined flows do not exceed the rated maximum flow capability of the MicroBlender. The use of a flow meter attached to either or both of the outlet ports may be used to control the flow of mixed gas.



Low Flow MicroBlender **High Flow MicroBlender**

(Front View)

An audible alarm indicates a differential of 20 PSI has been reached between air and oxygen inlet gas pressures.

Section 5: Performance Checks

Before placing the MicroBlender into clinical use, perform the following performance checks.

Warning! flow

If the MicroBlender does not function as described below, contact CareFusion (refer to the company information at the beginning of this manual).

DO NOT use the MicroBlender until correct performance is verified.

Low Flow MicroBlender Alarm / Bypass Check Reverse Flow Check

Adjustment	Response
1. Applying 30 -75 PSIG air/oxygen source gas. Adjust the control knob to 60%	1. Alarm/Bypass* should not activate (if gases are within 20 PSI of each other).
2. Disconnect the 50 PSIG air source from the MicroBlender.	2. Audible alarm, bypass* gas flow starts.
3. Reconnect the 50 PSIG** air source to the MicroBlender.	3. Audible alarm stops; bypass* gas flow stops flowing.
4. Disconnect the 50 PSIG** oxygen source from the MicroBlender.	4. Audible alarm, bypass* gas flow starts.
5. Reconnect the 50 PSIG** oxygen source to the MicroBlender.	5. Audible alarm stops; bypass* gas flow stops flowing.
6. Connect a flow meter and an oxygen analyzer to either outlet port; with the MicroBlender control knob set at 60%, adjust the outlet flow rate to 6 – 8 LPM.	6. Oxygen analyzer should read 60 ±3% when measured from the flow meter outlet.

*Bypass flow should occur whenever the alarm sounds, but this condition can only be verified by measuring O_2 concentrations with an oxygen analyzer.

**Gas supply pressures of 50 PSIG provide optimal performance.

High Flow MicroBlender Alarm / Bypass Check

Adjustment	Response
1. Connect the 50 ±5 PSIG* air/ oxygen source gases. Adjust the control knob to 60%. Connect the flow meter to the auxiliary outlet and set the flow to 2 LPM.	1. Alarm/Bypass should not activate.
2. Connect an oxygen flow meter to the auxiliary outlet to activate the auxiliary bleed and disconnect the 50 PSIG* air source from MicroBlender. NOTE: The MicroBlender must be flowing gas for the alarm to activate.	2. Audible alarm
3. Reconnect the 50 PSIG* air source to the MicroBlender.	3. Audible alarm stops. Verify oxygen concentration with an oxygen analyzer.
4. Disconnect the 50 PSIG* oxygen source from the MicroBlender.	4. Audible alarm.
5. Reconnect the 50 PSIG* air source to the MicroBlender.	5. Audible alarm stops. Verify oxygen concentration (57% to 63%) with an oxygen analyzer.
6. Verify that the oxygen flow meter is set at 2 LPM.	6. Oxygen analyzer should read 57 to 63% when measured from the flow meter outlet

Reverse Flow Check

1. Connect both gas supply hoses to the inlet connectors.
2. Connect the oxygen hose to an oxygen pressure regulator, and submerge the free end of the air hose in a container of water. Do not make a connection to either outlet (so that they remain closed).
3. Slowly adjust the oxygen pressure regulator to increase pressure from 0 to 50 PSIG* while looking for bubbles to rise from the submerged air hose connector.
   The presence of bubbles indicates leakage of the one-way valve and the need for repair.
4. If there is no leakage, disconnect the oxygen from the regulator and submerge the end of the hose in water.
5. Connect the air hose to an air pressure regulator and repeat the procedure. Repair if bubbles are present.
   *Gas supply pressures of 50 PSIG provide optimal performance.

Section 6: Troubleshooting Guide

Problem	Potential Cause	Corrective Action
Oxygen concentration discrepancy between MicroBlender settings and analyzer.	1. Analyzer out of calibration.	1. Calibrate the analyzer
	2. Flow requirements are below the specified LPM range.	2. Correct the flow. Verify that the correct outlet port is being used. Each outlet port has a different flow range.
	3. Gas supply is contaminated.	3. Correct the contaminated gas supply. If repair is needed, contact CareFusion
	4. MicroBlender is out of calibration.	4. Contact CareFusion for repair.
	5. Bleed filter is obstructed, causing reduction of bleed.	5. Contact CareFusion
	6. Air entrained into circuit by ventilator or accessory device.	6. Correct
Alarm sounding	1. Inlet pressure difference greater than 20 PSI.	1. Correct the pressure difference.
	2. Alarm module is not calibrated properly.	2. Contact CareFusion for repair.
	3. Inlet gas contamination, alarm module malfunction.	3. Contact CareFusion for repair.
MicroBlender in bypass - no alarm.	Reed plate improperly installed or damaged.	Contact CareFusion for repair.

Problem	Potential Cause	Corrective Action
MicroBlender is accurate only when inlet gas pressures are equal.	1. Balance module not functioning properly.	1. Contact CareFusion for repair.
	2. Both air and oxygen gas sources are below 30 PSIG.	2. Correct the low pressure condition.

Section 7: Cleaning and Sterilizing

Note:

User is to consult with the manufacturer of the ETO equipment for aeration time.

- Use an all purpose liquid cleaner on the exterior.
- Do not steam autoclave or otherwise subject the MicroBlender to temperatures over 145°F.
- Do not immerse the assembled Low Flow MicroBlender in liquid decontamination agents.
- Do not use any strong solvent cleaners on labels or markings.

Blenders manufactured by CareFusion are compatible with ethylene oxide gas sterilization.

Section 8: Maintenance and Service

Caution!

The MicroBlender should only be serviced or calibrated by a CareFusion trained technician.

CareFusion equipment is designed to provide the maximum amount of utilization with a minimum amount of maintenance. When determining the desired frequency of complete overhaul intervals, three variables must be considered:

- Frequency of use
- Cleanliness of compressed air source
- Use of an air inlet filter/water trap

The MicroBlender, like other pieces of health care equipment, will require routine maintenance over a period of time. Before to placing the MicroBlender into clinical use, follow the performance-check guidelines outlined in Section 5.

When using the MicroBlender with a compressed air source, an air inlet filter/water trap (P/N 07426 or equal) is recommended. Contaminants from hospital air lines may compromise the function of the MicroBlender.

Caution!

If the MicroBlender does not function as outlined in Section 5, contact CareFusion for service.

Applicable parts used in the MicroBlender have been cleaned and de-greased for oxygen service. All lubricants used during assembly are designed for use in an oxygen enriched environment. Use only CareFusion specified lubricants when servicing this device.

Elastomer components, such as diaphragms and o-rings, are designed to function satisfactorily for a minimum of two years. The need for cleaning and replacement depends on gas line conditions and is indicated by the MicroBlender not meeting its specified performance.

Section 9: Parts and Accessories

Parts and Accessories

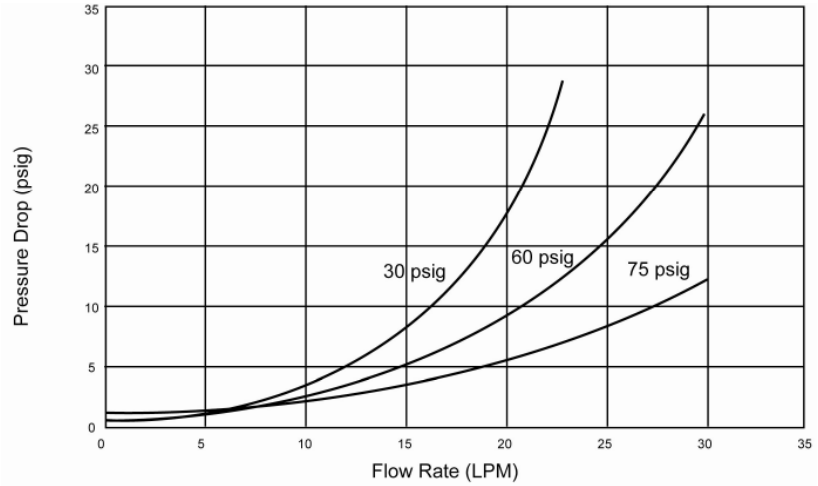
MicroBlender Brackets	
Part No.	Description
04322	Pole Mount 1 w/ Female Dovetail
05141	Dovetail Bracket, Accepts Built -in Bracket
05213	Dovetail Bracket, Wall Mount Female
09437	Rail Mount Adapter Bracket
Optional Accessories	
Part No.	Description
00060	Oxygen Supply Hose, 15 ft.
00066	Elbow Adapter 90°
01468	Y-Connector 9/16 – 18 Female and Male Threads for Dual Flow Meters
02899	Air Supply Hose, 15ft.
03867	Air Supply Hose, 3 ft.
07426	Air Inlet Filter/Water Trap

Section 10: Explanation of Abbreviations

Air/O_2	Mixture of Compressed Air and Oxygen
°C	Degrees Centigrade
CGA	Compressed Gas Association
DISS	Diameter Indexed Safety System
°F	Degrees Fahrenheit
FiO_2	Fractional Concentration of Inspired Oxygen
O_2	Oxygen
LPM	Liter Per Minute
P/N	Part Number
PSIG	Pounds Per Square Inch Gauge

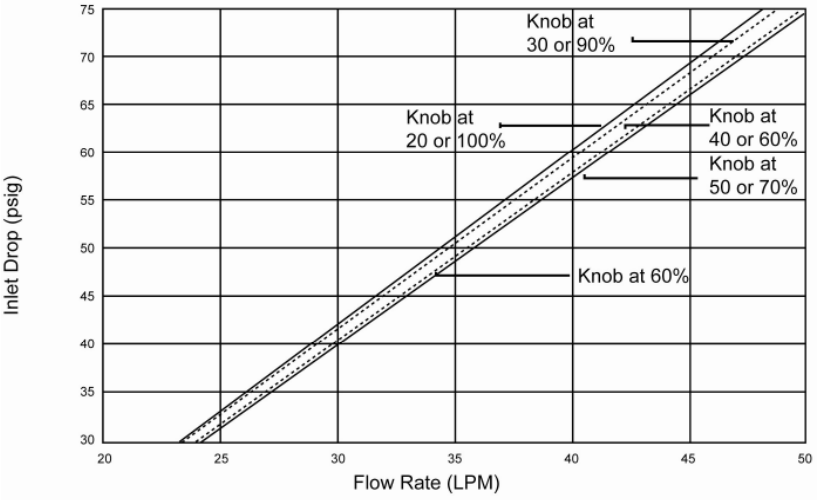
Do not operate the MicroBlender outside the supply pressure range (30–75 PSIG). Gas supply pressures of 50 PSIG provide optimal performance. The graphs on the following page illustrate typical flow performance characteristics of a representative sample for the Low Flow MicroBlender. The graphs are typical of a representative sample; slight variations among units should be expected.

Section 11: Specifications



Outlet Pressure Drop at Flow

Note: The graphs are typical of a representative sample; slight variations among units should be expected.



Average Outlet Flow at Various Inlet Pressures

Gas Inlet Supply Pressure	Low Flow	30 – 75 psig
	High Flow	30 – 75 psig. Output flow rate will be diminished if either supply pressure is below 50 psig; output flow will increase if both supply pressures are above 50 psig.
Oxygen Concentration Control	Low Flow and High Flow	21 to 100%
Auxiliary Outlet Flow Range	Low Flow	Right Side Outlet 0 – 30 LPM (Bleed 2.5 – 3.5 LPM)
	High Flow	Right Side Outlet 2 – 120 LPM (Bleed 10 – 12 LPM)
Primary Outlet Flow Range	Low Flow	Left Side Outlet 3 – 30 LPM (No Bleed)
	High Flow	Bottom Port 15 – 120 LPM (No Bleed)
Maximum available flow at 60% setting with 50 psig both inlets	Low Flow	>30 LPM
	High Flow	>120 LPM
Accuracy	Low Flow and High Flow	The accuracy is ±3% FIO_2 at any set-point, provided the inlet supply pressures are between 30 and 75 psig and the difference between them does not exceed 20 psi.
Stability	Low Flow and High Flow	O_2 concentration shall not vary from a set-point by more than ±3% if either the inlet supply pressure or the output flow rate is changed within its range specified herein.
Alarm/Bypass Activation	Low Flow and High Flow	When inlet gas pressures differ by 20 ±2 psi.

Alarm Sound Generator	Low Flow	Reed Alarm
	High Flow	
Alarm Sound Intensity	Low Flow	80 dB minimum at 1 foot
	High Flow	80 dB minimum at 1 foot
Alarm/Bypass Reset	Low Flow	When inlet gas pressure differential is 10 PSI or less
	High Flow	When inlet gas pressure differential is 6 PSI or less
Pressure Drop	Low Flow	Less than 6 PSI at 50 PSIG inlet pressures and 10 LPM flow rate
	High Flow	Less than 6 PSI at 50 PSIG inlet pressures and 40 LPM flow rate
Weight	Low Flow	2.75 lb. (1 .25kg)
	High Flow	
Dimensions (Excluding Fittings)	Low Flow	Height: 3 1/2 in. (8.9cm) Width: 2 1/4 in. (5.8cm) Depth: 3 5/8 in. (9.2cm)
	High Flow	Height: 3 1/2 in. (8.9cm) Width: 2 1/4 in. (5.8cm) Depth: 4 1/2 in. (11.5cm)

Note: Product specifications are subject to change without notice.

Section 12: Warranty

THE PRODUCTS OF CAREFUSION CORPORATION (CAREFUSION HEREIN) ARE WARRANTED TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP AND TO MEET THE PUBLISHED SPECIFICATIONS.

The liability of CareFusion under this warranty is limited to replacing, repairing or issuing credit, at the discretion of CareFusion, for the parts that become defective or fail to meet published specifications during the warranty period; CareFusion will not be liable under this warranty unless (A) CareFusion is promptly notified in writing by Buyer upon discovery of defects or failure to meet specifications; (B) the defective unit or part is returned to CareFusion, transportation charges prepaid by Buyer; (C) the defective unit or part is received by CareFusion for adjustment no later than four weeks following the last day of the warranty period; and (D) examination by CareFusion of such unit or part shall disclose, to its satisfaction, that such defects or failures have not been caused by misuse, neglect, improper installation, unauthorized repair, alteration or accident.

Any authorization of CareFusion for repair or alteration by the Buyer must be in writing to prevent voiding warranty.

CareFusion warranties as hereinabove set forth shall not be enlarged, diminished or affected by, and no obligation or liability shall arise or grow out of the rendering of technical advice or service by CareFusion or its agents in connection with Buyer's order of the products furnished hereunder.

Limitations of Liabilities

In no event shall CareFusion be liable to Buyer for loss of profits, loss of use, consequential damage or damages of any kind based upon a claim for breach of warranty, other than the purchase price of any defective product covered hereunder. This warranty does not cover normal maintenance such as cleaning, adjustment or lubrication and updating of equipment or parts.

This warranty shall be void and shall not apply if the equipment is used with accessories or parts not manufactured by CareFusion or authorized for use in writing by CareFusion, or if the equipment is not maintained in accordance with a prescribed schedule of maintenance.

The warranty stated above shall extend for a period of one year from date of delivery, with the following exceptions:

- Electrical components for remote monitoring of physical variables such as temperature, pressure, oxygen saturation or flow are warranted for ninety (90) days from date of receipt.
- Elastomeric components and other parts or components subject to deterioration over which CareFusion has not control are warranted for sixty (60) days from date of receipt.

The foregoing is in lieu of any other warranty, expressed or implied, including, without limitation, any warranty of merchantability, except as to title, and can be amended only in writing by a duly authorized representative of CareFusion.

Low Flow MicroBlender
and
High Flow MicroBlender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